# Introduction

The performance of a measuring instrument is one of the most important factor which affects:

a. The choice between commercially available instruments.

b. The design procedure for a specific measuring task.

The treatment of instrument performance characteristics has generally been divided into:

a. Static characteristics.

b. Dynamic characteristics.

# Static characteristics

- Measurement of quantities that are constant or vary only quite slowly with time.
- The experimenter is only concerned here with measuring **accurately** the amplitude (i.e. magnitude).
- **Accuracy, precision, and sensitivity** are used to define the performance of static measuring instrument.

# Static calibration (1)

**All the static performance characteristics are obtained by a process called "static calibration"**

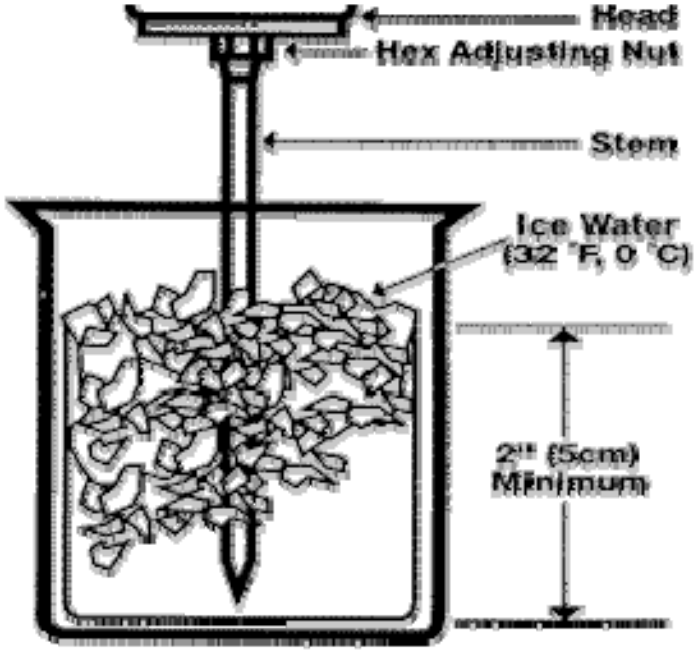
- **Static calibration** refers to a situation where all inputs except one are kept at some constant values.
- The one input under study is then varied over some range of constant values; causing the output to vary over some range of constant values.
- calibration leads to a relationship between the values of the physical quantity applied to the instrument and the instrument reading.

# Static calibration (2)

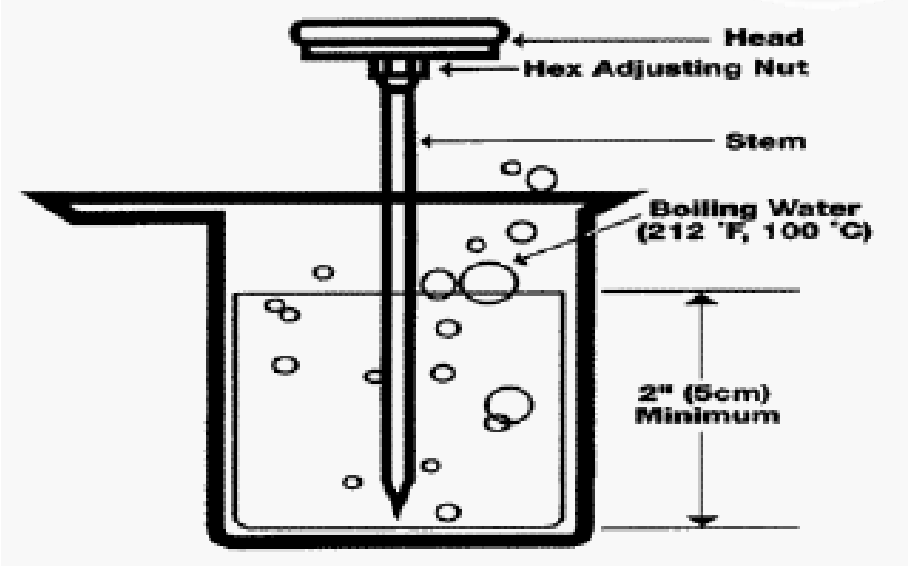
**Calibration may be achieved by comparison with:**

- **Primary standard**
- **Secondary standard which has higher accuracy than the instrument to be calibrated.**
- **Known input source.**

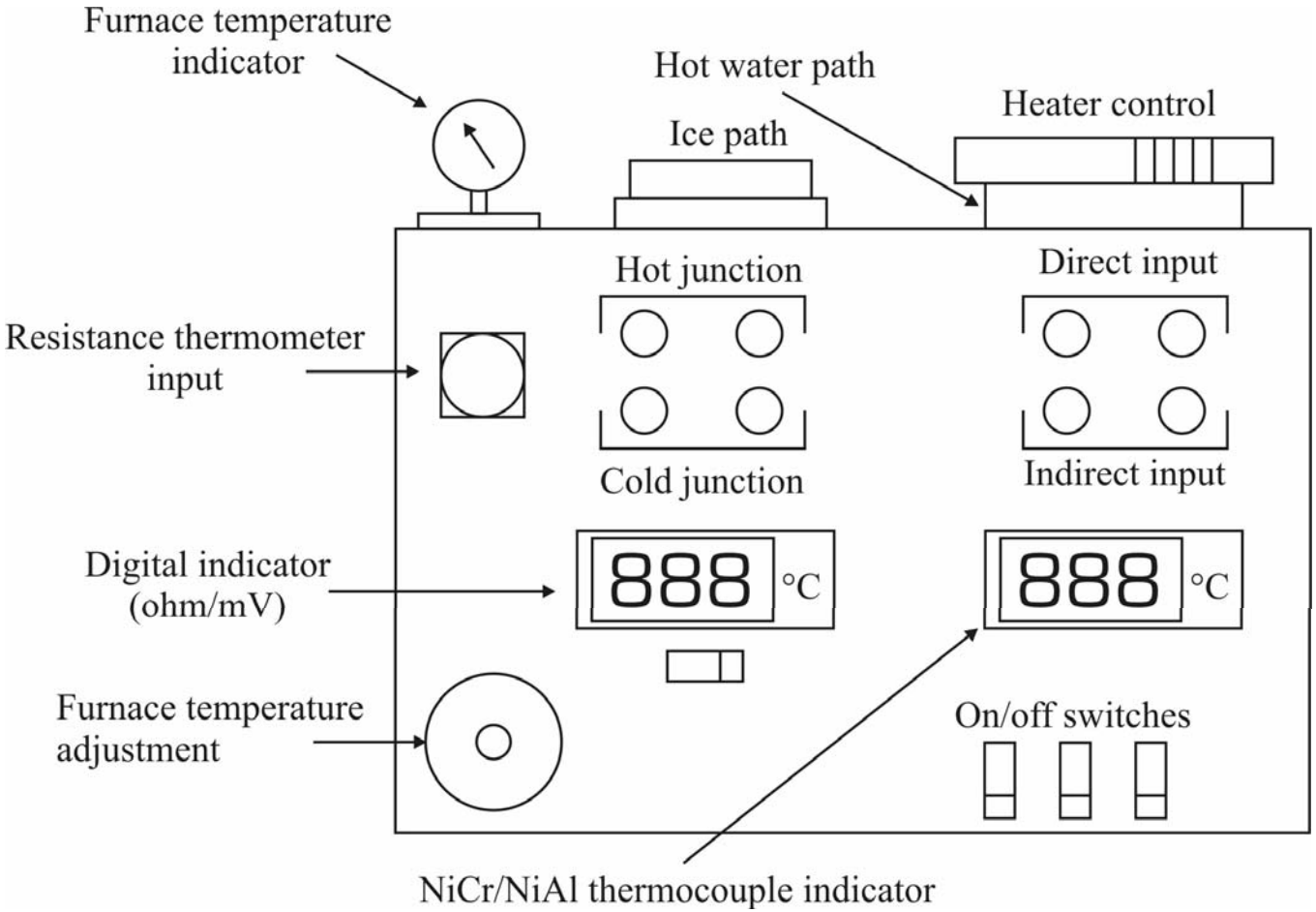
# Thermometer Calibration



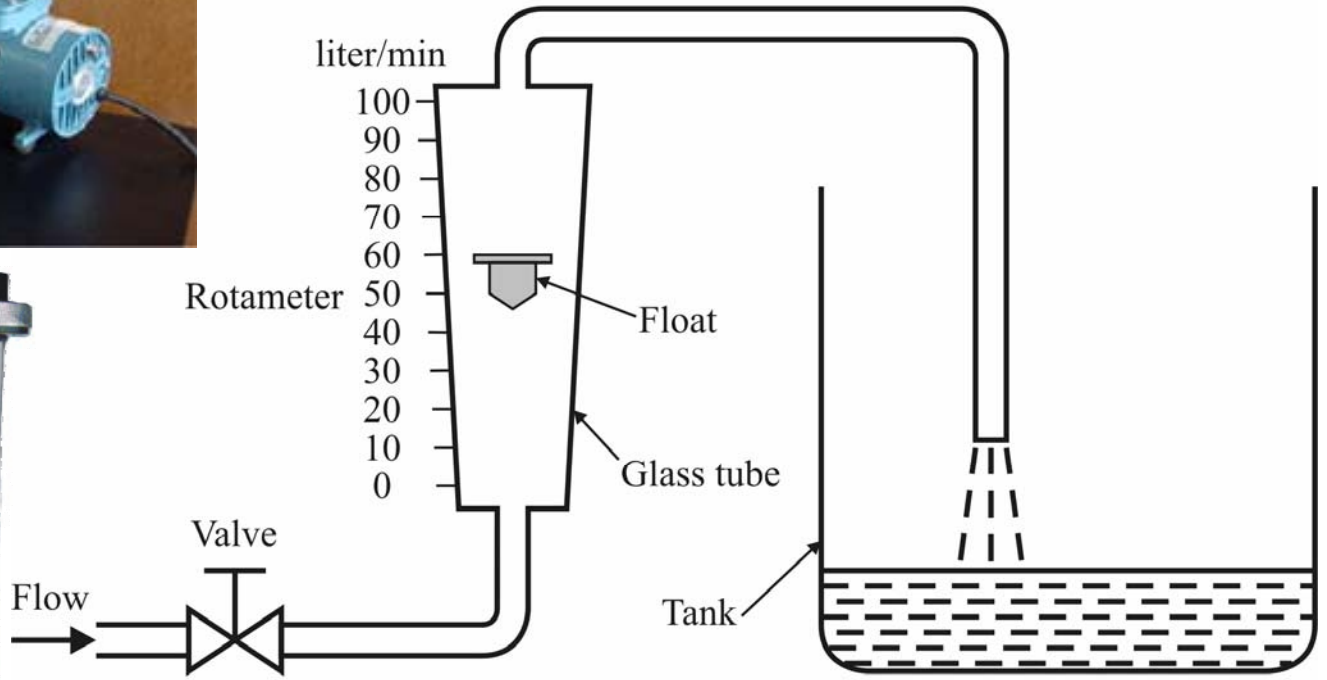




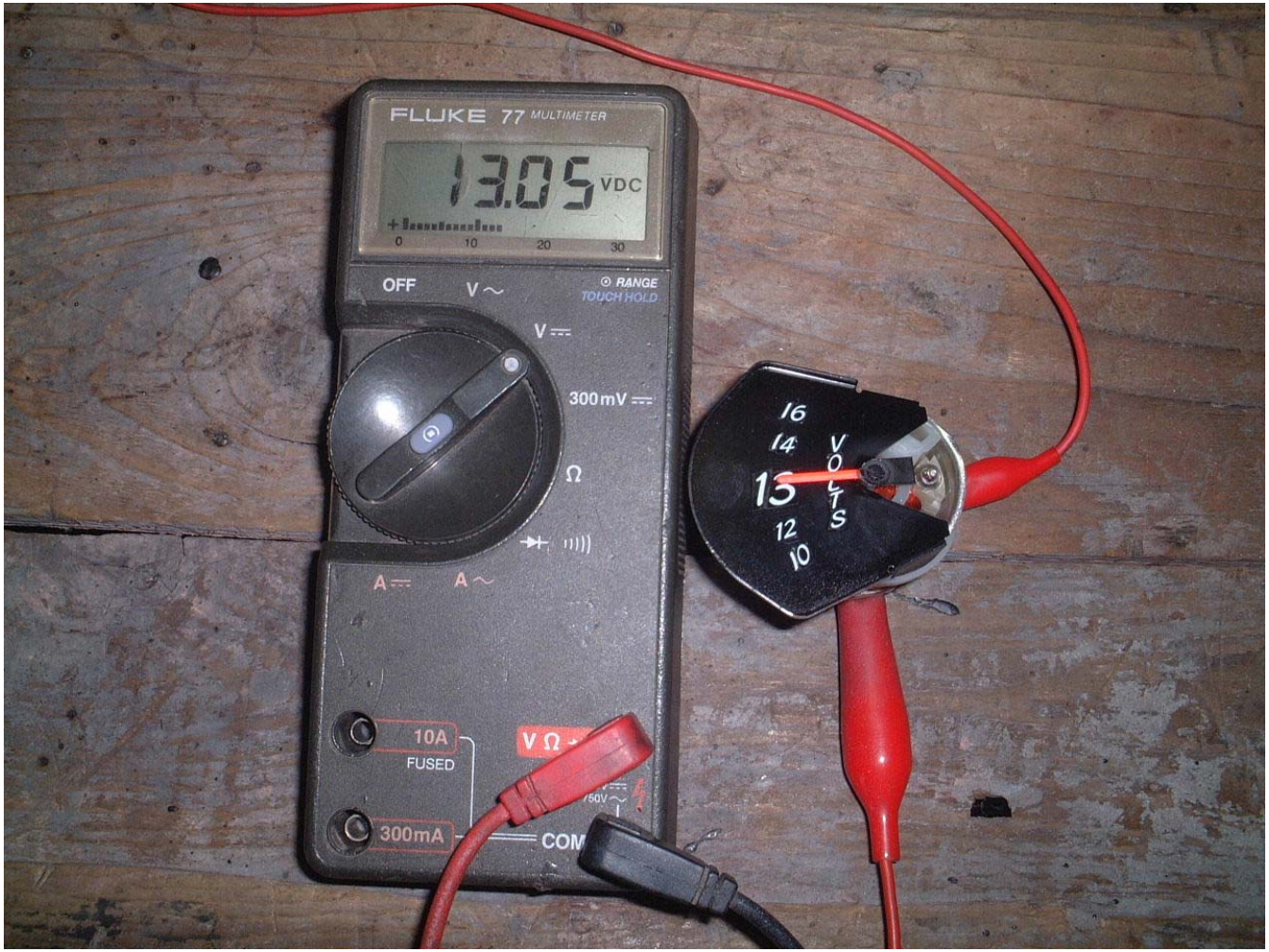
# Thermocouple and RTD Calibration



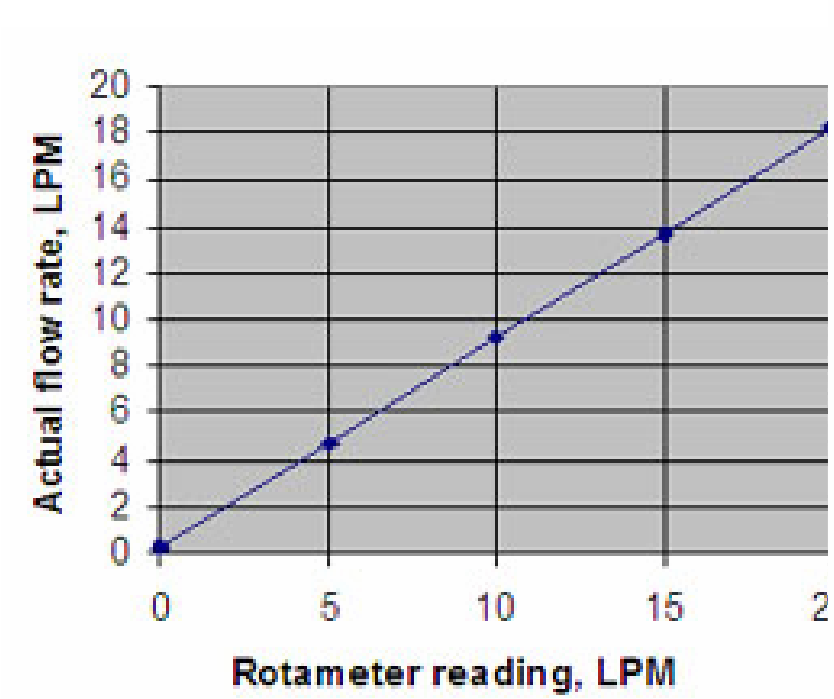
# Rotameter Calibration

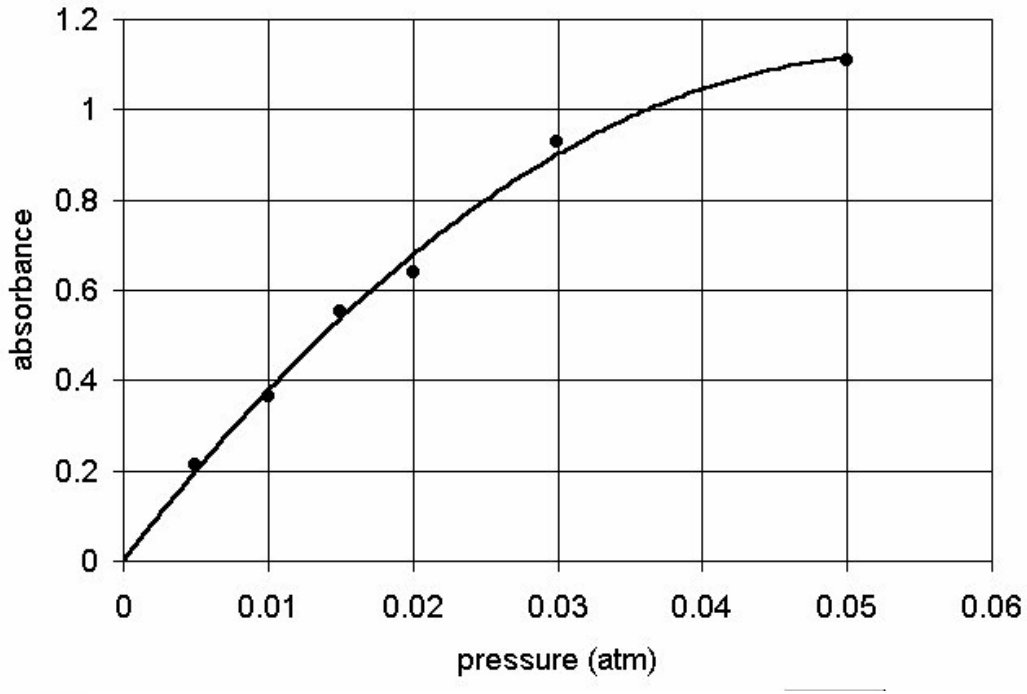


# Voltmeter Calibration



# Calibration Curve

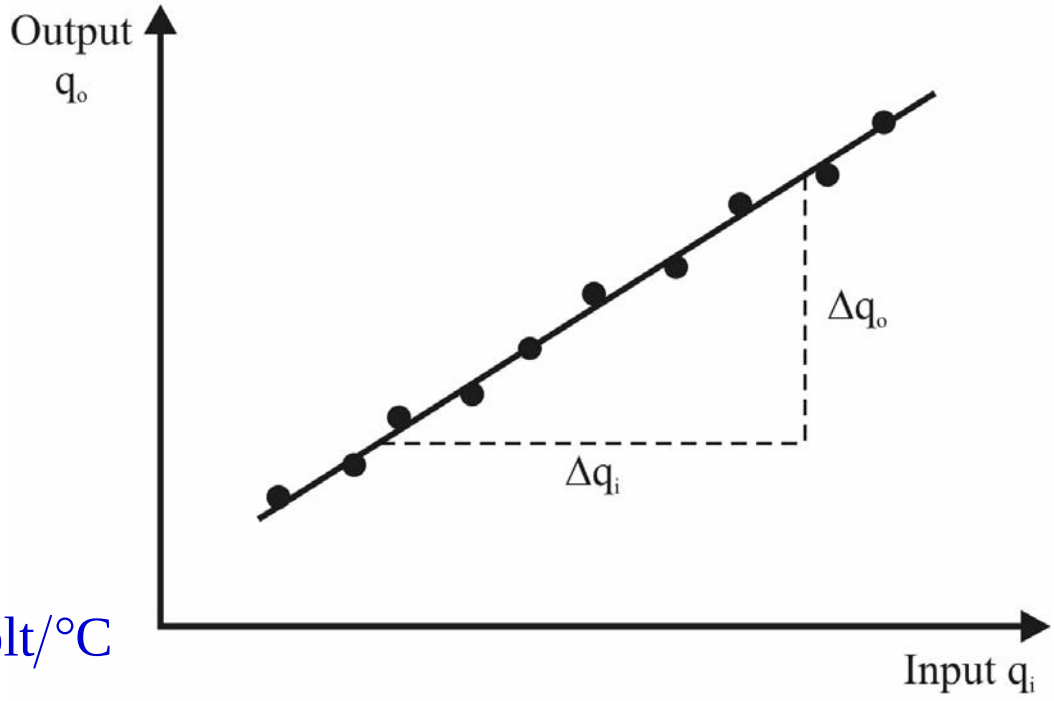


# Static Sensitivity (1)

When an input/output calibration has been performed, the static sensitivity can be define as the **change of output** per **unit change of the input**; i.e. the **slope of the calibration curve**.

$$\text{Sensitivity } S = \frac{\Delta \text{output}}{\Delta \text{input}} = \frac{\Delta q_o}{\Delta q_i}$$

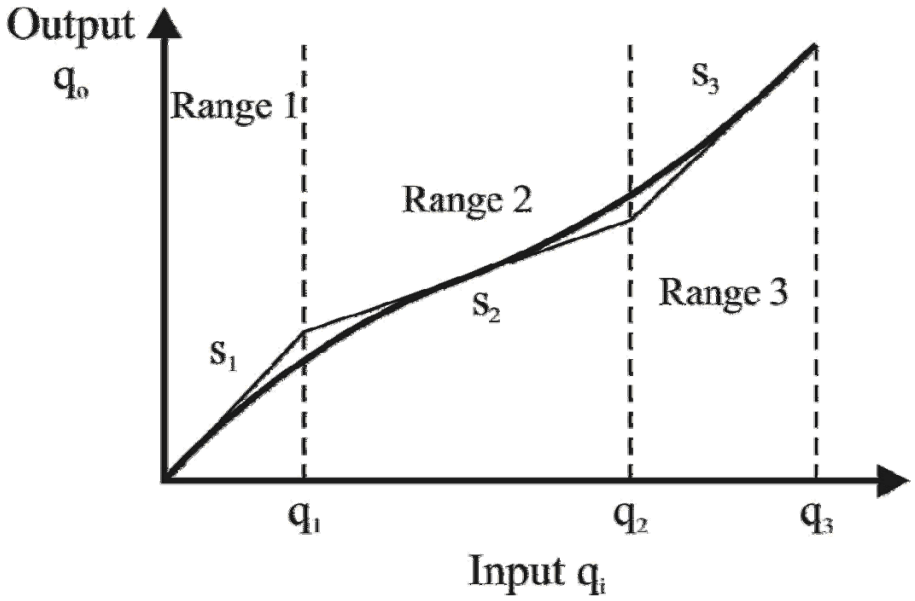


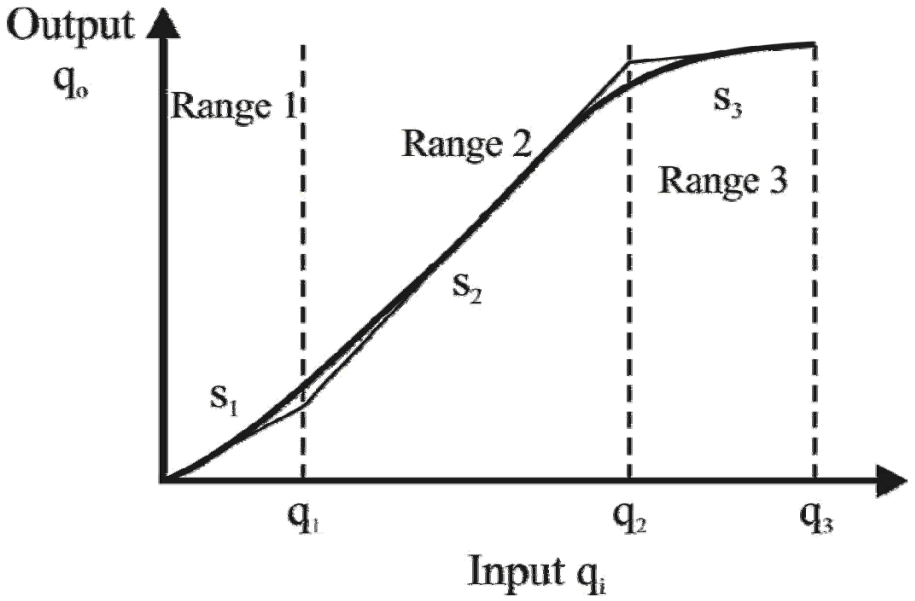

**For Example:**

$$\text{Thermocouple sensitivity} = \frac{\Delta V_o}{\Delta T_i} \quad \text{volt}/^\circ\text{C}$$

# Static Sensitivity (2)

$$\text{Sensitivity } S = \frac{d\,\text{output}}{d\,\text{input}} = \frac{dq_o}{dq_i}$$




Thank You!